Threatened Species Assessment

Gahnia subaequiglumis
Bog Saw-sedge

Taxonomy

Gahnia subaequiglumis S.T. Blake

Current conservation status

Categorised as Vulnerable in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Endangered in Victoria

Criteria A3c+4bc; B1ab(i,ii,iii,v)+2ab(i,ii,iii,v); D

Species Information

Description and Life History

The taxon is a tufted perennial. Culms 30-60 cm high, 3-5 mm diam. Leaf-blades flat, erect to spreading, scabrous, about as long as inflorescence; ligules narrow, chartaceous; sheaths brown, dull. Inflorescence narrow, erect, 20-40 cm long, with 10-12 nodes. Spikelets 2-flowered; glumes 6-7, the uppermost glume much shorter than others, dark brown to black, scaberulous, with apex long- to short-mucronate; stamens 3 or 4; anthers 1.7-2.3 mm long excluding apical appendage c. 0.2 mm long. Nut narrow-ellipsoid to ellipsoid, trigonous or rarely 4-angled, reticulate, shining, 4.0-4.5 mm long, 1.5-2.0 mm diam., red. The taxon flowers from spring to summer (VicFlora, 2017).

Generation Length

The generation length of *Gahnia subaequiglumis* is inferred to be 50 to 150 years. This is based on the shortly rhizomic perennial habit of the taxon and its dependence on stable old-growth, ecotonal habitats.

Distribution

The taxon is known in Victoria only along the fringes of the upper Delegate River, and also occurs in Queensland and New South Wales (VicFlora, 2017). It is known from two subpopulations: Gap Road crossing of Delegate River and Gunmark Road at Tea Tree Flat; and on Delegate River West Branch.

Habitat

The taxon occurs in swampy heathland and grassy montane woodland fringing the upper Delegate River (VicFlora, 2017), at an altitude of approximately 900 metres.

Threats

The key threat identified for this taxon is the combination of altered fire regimes and the impacts of past and present forestry operations within the headwaters of the Delegate River Catchment, more marked in the West Branch than the East Branch. This has resulted in modification of the hydrological regime on which the sphagnum bog habitat, along the Upper Delegate River, depends. Observations over 40 years indicate that there was a steady contraction of sphagnum swamp at Tea Tree Flat, where the taxon formed a fringing, ecotonal, highly localised band, and invasion by shrubs and ultimately trees.

These long-term declines in the extent and quality of the specific habitat of the taxon are exacerbated by the direct and indirect impact of climatic warming and drying which, in addition to inappropriate fire regimes, increase the risk of fire at greater frequency, intensity and landscape scale. It should be noted that the pre-settlement hydrology of the Upper Delegate was buffered by the extensive mosaic of Cool Temperate Rainforest, Cool Temperate Mixed Forest, and old-growth Montane Wet Forest which maintains steady stream flow throughout the year to all sphagnum bog and related wetland communities downstream.

Forestry within the headwaters, documented by Kershaw and Gell (e.g. Kershaw & Gell 1990, Gell et al. 1993) has resulted in more significant changes in palynological depositional character (i.e. pollen profile) than has been experienced since the last ice age. There is also extensive plantation development adjacent to Gap Road subpopulation downstream.

Spatial analysis of likely habitat on all land tenures for *G. **subaequiglumis*** indicates that 46% occurs within the Comprehensive, Adequate and Representative (CAR) reserve system, including parks and reserves and special protection zones. Further areas are excluded from harvesting by prescription under the Victorian Code of Practice for Timber Production 2014 (the Code). Species-specific protections for the taxon are included in the Code. Other more general prescriptions such as protection and buffering of waterways also provide protection from forestry operations. In recent years, modified harvesting and forest regeneration practices have been implemented in native forest that are designed to further mitigate the potential threat from forestry operations to threatened species and their habitats.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [*(a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Eligible under Criterion A2 as Vulnerable

The population reduction over the past 150 to 450 years is estimated to be 30 to 50% (midpoint 40%), based on (c) above.

Large portions of the Delegate River area between Bonang Highway and Gunmark Rd have been cleared or subject to forestry operations, leading to impacts on up to 50% of potential habitat.

Eligible under Criterion A3 as Endangered

The population reduction over the next 100 years is suspected to be 30 to 50%, based on (c) above.

There is a high probability that populations north of Gunmark Rd will be lost due to the habitat becoming marginal.

Eligible under Criterion A4 as Endangered

The population reduction over any 150 to 450 year period, including both past and future (up to 100 years in the future), is suspected to be 30 to 55%, based on (c) above.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B1 as Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the Area of Occupancy (AoO) to ensure consistency with the definition of AoO as an area within EoO.

The taxon is estimated to have one location, as all key identified threats apply across its very limited range and can rapidly affect all individuals of the taxon present, but may apply at different scales for populations that are within the reserve system and those that are not.

It has a continuing decline in (i), (ii), (iii) and (v) above, inferred from the observed contraction in the habitat of the taxon and the ongoing decline in habitat quality (e.g. changes in hydrology from forestry, invasive animals etc.).

Eligible under Criterion B2 as Endangered

The AoO across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it severely fragmented, has 1 location and has a continuing decline in (i), (ii), (iii) and (v) above.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Ineligible under Criterion C

It is estimated that there are 100 to 250 mature individuals, but other thresholds under this criterion have not been met.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	< 50	< 250	< 1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO < 20 km2 or number of locations ≤ 5

Evidence:

Eligible under Criterion D as Endangered

It is estimated that there are 100 to 250 mature individuals. The population count at the best known site, Gunmark Rd, has approximately 50 plants. There are four other records with an unknown number of plants. If all records are of similar plant number, then fewer than 250 mature individuals are likely to exist.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014.* Department of Environment and Primary Industries, Melbourne. Retrieved from:

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